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SEMIANNUAL TECHNICAL REPORT  
STUDY OF AGE DETERIORATION OF GASKET MATERIALS  
INSTALLED IN SIMULATED LAUNCH VEHICLE HARDWARE  
CONTRACT NUMBER NAS8-1523

The semiannual functional and leakage tests as specified in Article I of Modification Number 3 of Contract Number NAS8-1523 were carried out during the period of April 28 to 30, 1964. During these tests, procedures were followed as set forth in MTP-P&VE-M-62-6, "Aging of Installed Rubber and Plastic Gaskets in Simulated Flight Hardware", dated March 5, 1962.

The test results were recorded on data sheets provided during earlier modifications of the contract. These data sheets provide a cumulative record of the test history of each individual unit under test. Since there are some 192 of these data sheets with data for the 421 units now under test, it was considered expedient to rearrange the data on a fewer number of sheets for purposes of this report. The arrangement of the revised data sheet is self explanatory and should offer no difficulty in transferring the data to the duplicate records maintained by the contracting agency.

The results of this test have been entered on the original data sheets and these, together with a copy of the revised sheets, are kept on file by the contractor.

#### SUMMARY OF TEST RESULTS

- A. There was no significant variation in the results from those obtained during the previous tests in November, 1963.

OTS PRICE

XEROX

\$ 1.10 ph

In no case did the leakage rate exceed the allowable rate. However, the following results should be pointed out:

1. Fixture 6-17, Valve assembly MV-76 did not show any leakage in this test whereas in the previous test there was a leak of 20 cc/min at the stem. This unit had not leaked during any other previous test since installation in April, 1959.
2. Fixture 8-1A, Thrust chamber seal, leaked at 113 cc/min, as compared with 36 cc/min in November, 1963 and 80 cc/min in April, 1963. Since the allowable leakage is 409 cc/min, this unit is well within tolerance.
3. Fixture 9-2A, Thrust chamber seal, showed a leak rate of 30 cc/min as compared with no leak in November, 1963. With an allowable leak of 409 cc/min this leak rate is not significant. Also this fixture has a history of alternately leaking and not leaking.
4. Fixture 10-2A, Thrust chamber seal, showed a leak rate of 320 cc/min as compared with an allowable rate of 409 cc/min. This unit has leaked at approximately the same rate at each test since April 1960. It is possible that the leak is due to faulty installation rather than any deterioration of the O-ring.

5. Fixture 16-12, Bolted O-Ring, showed a small leak at the juncture of the inlet flare fitting and the body of the flange. This leak does not in anyway affect the performance of the installed O-ring, which showed no detectable leak. This fixture will be closely observed in future tests for any indication that the faulty joint can materially affect the performance of the unit.

#### RECOMMENDATIONS

It was observed that a considerable number of the bolted flanges showed what appeared to be leaks around the bolts when immersed in water. In previous tests conducted by personnel of the George C. Marshall Space Flight Center these apparent leaks were not taken into account on the basis that the bubbles were air trapped around the bolts and washers. However, it was observed that with several of these flanges the bubbles persisted even after agitation of the fixture and a reasonable wait for them to stop and that, furthermore, the bubbles formed at regular intervals rather than randomly as might be expected with entrapped air. Although the rate of formation of these bubbles was well below the allowable leakage rate, it is recommended that, in future tests, fixtures which show leaks around the bolts be agitated, and if the bubbles continue to appear at regular intervals, that they be included as part of the recorded leakage of the fixture.